

International defence industrial co-operation in the post-financial crisis era



A survey of emergent thinking in Washington DC, with contributions from

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Abstract

UK and US defence capabilities have benefitted extensively from close industrial and technological cooperation for over 70 years. As the two allies contend with the fiscal challenges of the post-financial crisis era, the time is right to consider the benefits of close cooperation and approaches to maximise these for the future. The British Defence Staff in the United States convened a group of opinion formers from the American Enterprise Institute, Atlantic Council, Center for a New American Security and Stimson Center to reflect on some of the key points in this discussion..

- The first paper applies the economist David Ricardo's concept of comparative advantage to international defence cooperation and questions where the incentives to act on the opportunity rest.
- The second considers whether current approaches to protecting and controlling technology are appropriate for the new century, particularly in light of the technological leaps being witnessed in civil areas.
- The third employs the framework of a business model to reconsider the customary practices that underlie transnational armaments cooperation and recommend a more effective approach.
- The fourth paper reflects on the combination of budgetary pressures and technological surprise that has catalysed change in defence procurement during previous cycles.

The papers are collated in this document for ease of reference. The views within are the authors' own and do not reflect the view of the British government, nor does the British government endorse the recommendations contained.

International defence industrial cooperation – acting on opportunities in testing times

Lewis Hedge

Equipment co-operation: a potted history

The P-51 Mustang was an iconic fighter aircraft in US combat service during the 1940s and 1950s. A global phenomenon, it was also pressed into service by allies including Australia, South Africa, the Republic of Korea, France and the Netherlands. It was born, however, out of a Royal Air Force requirement. It was the choice of the Rolls Royce Merlin engine, built under licence in the US by Packard, that provided the aircraft with its high altitude performance. Though the Mustang was faster than the Supermarine Spitfire that it succeeded, the engine was an iteration of the one that powered the Spitfire and the Hurricane to victory during the Battle of Britain in 1940.

The Mustang's story is just one of many to have demonstrated the value of international cooperation in the fields of technology and manufacturing in achieving scientific break-throughs and operational success. Also of that era, the first operational sonar evolved from British and French prototypes with the influence of Canadian physicist Robert Boyle, and was subsequently transferred to the US as part of a British programme to secure exploitation routes for wartime innovation.

More recent examples include the AV-8B Harrier Jump Jet – built in the US by McDonnell Douglas as an evolution of the earlier British Hawker Siddeley model, and still in service with the US Marine Corps – the T45 Goshawk, again a McDonnell Douglass-manufactured variant of the British Aerospace Hawk, serving as jet trainer for the US Navy and US Marine Corps. On land, Chobham armour, developed in the UK in the 1960s was adopted for the M1 Abrams main battle tank. And, successive iterations of that technology have succeeded on the strength of existing close cooperation in that technology domain.

Winding forward to the present day, we have seen British technology at the forefront of counter-

IED efforts in Afghanistan and Iraq, advanced surveillance systems and force protection. And the same goes for US-sourced technology and equipment in the UK's capability mix: the Husky, Mastiff and Wolfhound armoured vehicles, Apache, Sea King, MQ-9 Reaper and shortly Rivet Joint and F-35, to name but a few. Looking to the future, the UK is investing in space, cyber, data analytics, energy and autonomy.

Bilateral defence trade also continues apace. Estimates of US purchases from UK defence contractors varied between \$1.2bn and \$1.5bn for 2013, while estimates of UK purchases from the US are about double that. The UK-US Defence Trade Cooperation Treaty signed in 2012 and the Reciprocal Defence Procurement Memorandum of Understanding are there to underpin trade and industrial base access.

Money: competing demands for public funds

Many of these examples date to eras of heightened defence expenditure linked to major conflicts and the necessity of the threat during the Cold War. However, in the present day, the economic climate and the contemporary experience of the post-financial crisis world and competing demands on national expenditure have curbed current defence expenditure while moderating the outlook for future years.

In the US, repeated battles over the federal budget, debt levels and demands on the public purse have led to cuts in from highs of \$691bn (including overseas operations in 2010/11 to \$575bn (inc. OCO) requested for 2015. The Ryan-Murray budget deal reached in December 2013 to secure government spending for FY14 and FY15 shielded the budget from the sequester budget cuts for a period, but the threat of further caps looms after 2016. Moreover, the Congressional Budget Office forecasts that during the coming decade mandatory spending –

other than that for Social Security and health care, and discretionary spending (including defence) – stand to fall to their lowest percentage of GDP since 1940, as health care costs and interest payments ramp up.

In the UK, the independent Office for Budget Responsibility estimates that public finances will move into surplus after 2018 as the economy continues to recover and further planned spending cuts are brought to bear.

So the projections point to ongoing pressure on public spending, including defence. Yet, defence is not getting any cheaper. Intergenerational cost growth of defence equipment is well documented, with estimates from academic studies of annual cost escalation ranging between 7 per cent and 11.5 per cent per annum as the mean for all equipment types. Moreover, personnel costs are rising as a proportion of the cost of defence. This is observed in stark contrast with civil technology, where the trend is towards better performance at equal or lower cost year-on-year (automotive, smart phones, information technology, etc.). The US Department of Defense is now returning to technology offsets as a mechanism to deliver advanced capability within the financial envelope. Equally, both the US and UK are contending with the rising capitation costs of military personnel and taking steps, in some instances through collaborative projects, to reduce the through-life cost of ownership of military capability, especially externally driven costs such as operational energy.

Hard choices ensue, and while current measures to control the budget have cut back discretionary spending, including defence, growing healthcare and welfare entitlements stand to force difficult choices about the respective importance of these different areas of national policy.

At \$495.6bn and £34.6bn respectively, US and British core expenditure on defence are an order of magnitude apart, yet both countries are among the top 5 global defence spenders and both uphold the NATO commitment to spend at least 2 per cent of GDP on defence (4.8 per cent and 2.7 per cent respectively). The UK remains the second largest spender in NATO in absolute terms. And while both

countries continue to maintain the full spectrum of military capabilities despite the downturn, both have made tough choices in recent years.

Value: benefits of cooperation between allies

So the case for seeking the greatest value through partnerships remains strong, whether in cost avoidance, pooling capabilities, or leveraging foreign research and development. The examples enumerated at the top of this introduction reflect instances of cost and duplication being avoided, and time saved by using or building on the capabilities of a partner or combining requirements.

This is not always as straightforward as operating a uniquely national programme, and incurs additional risk and up-front administrative cost. Economists also argue that on-shore investment in defence capability effectively comes at a discount of up to 20 per cent once the effect of money flowing through the economy and tax revenues are taken into account. However, seen through the prism of the collective economic footprint of alliances, there is similar collective benefit to be had.

But when the alternative is that the capability remains beyond the reach of an individual country's armed forces for want of affordability or access to desired technologies within the financial envelope or time available absent cooperation, the incentives in favour of partnership begin to crystallise. In non-nuclear defence science and technology, current UK-US cooperation through joint programmes and information sharing delivers benefits to both countries in the order of hundreds of millions of dollars each year. This is a powerful example of return on investment.

Emergent thinking

So there is much that might be done, but looking back to past successes and failures it is sensible to think about the best way forward for the twenty-first century. The British Defence Staff asked a group of opinion formers from the American Enterprise Institute, Atlantic Council, Center for a New American Security and Stimson Center to reflect on some of the key points in that discussion, and present their views in this series of papers. While the British

Defence Staff endorses and supports the discussion, the views expressed are those of the authors and do not reflect the view of the British government, nor does the British government endorse the recommendations contained.

Budgets as drivers for sharing technology

Russell Rumbaugh

Times are tight in defense on both sides of the Atlantic. Since 2010, the US defense budget has fallen by 21% in real terms, while the British defense budget has fallen by 20%. These declines have forced real choices in both countries: entire fleets of aircraft set for retirement, significant reductions in number of uniformed personnel, and fewer ships bought each year. As usual when such choices loom, many call for greater efficiency: by spending what money is left better, we can get more from it.

A perennial idea to get more from less is further embracing international cooperation, especially in technology development. If allies like the United States and United Kingdom could decide what comparative advantage each has in technology development, each could spend less but still get the same amount of capability. Despite the fears of declining budgets, though, defense budgets have not yet tightened far enough to overcome the political obstacles to greater cooperative development. Only when the US and UK militaries confront losing their global power projection will they really be forced to overcome these obstacles.

Technology development is a particularly promising area for international cooperation, especially between close allies. It is an inherently risky activity: its never obvious what payoff any given investment will achieve. And technology development does not have to be exclusively competitive: though some technological breakthroughs have fundamentally altered how wars are fought, it is often how the technology is used rather than its invention that is the critical difference. That competitive advantage becomes even less important when discussing cooperation between two close allies like the United States and United Kingdom. If these characteristics can be capitalized on, the United States and United Kingdom could share the burden of investment and thus mitigate the burden of risk, allowing each to truly get more defense out of less defense spending. Moreover, there has been some success in this area. Just this year the two countries signed an agreement on science and technology development.

However, though times are tough in defense today, they are not so tough to drive either country's defense establishment to fully realize such a fairly obvious efficiency. Hidden in the tales of woe over defense budget declines is the fact that neither the American or British military have yet had to make a truly hard choice — a choice that undermines a sovereign military that can project power anywhere in the world.

The United States military is unique in its scale and global reach. The United States invests more on defense than any other country. In fact, the only question is whether the United States invests more on defense than all other countries combined, an answer that changes principally because of how much the United States chooses to spend every year rather than what any other country does. Sustained over decades, that investment has given the United States more of everything. Its navy has a total tonnage three times greater than any other nation. It has 75 percent more combat aircraft than any other country, all of a world leading standard in quality and capability. If quality and modernization is considered, the United States has more of the newest tanks, armored vehicles, and other trucks than any other country. The United States keeps the third largest number of personnel in uniform worldwide, despite paying significantly more per person; the United States has a per capita GDP nine times the average of the other countries with the 10 largest standing militaries.

Besides this sheer scale, the United States also has a unique global reach. No other country deploys as many forces to as many countries worldwide as the United States does. The United States has ten times more satellites in space than any country save Russia, and Russia is also the only other country to maintain a global satellite navigation system. Yet Russia only has a few hundred troops outside of countries contiguous with its borders and the United States has more than a hundred thousand.

The UK military is not on the same scale of the US, with a military about the size of the US Marine Corps in terms of people, aircraft, and ships — if you count the amphibious ships of the US Navy. But that still gives it the fourth largest defense budget and a top 25 rank in all military equipment except armored vehicles. More importantly, the British force also still maintains all the organic sovereign capabilities necessary to project power globally.

That smaller scale does mean the UK military is always closer to facing choices that really would portend losing a power projection capability. The UK military came close to such a decision in 2010 when it had to decommission a carrier to free resources for current land-based strike operations. But the decision to decommission was coupled with a decision to buy two Queen Elizabeth carriers in the coming years, and so the UK military did not have to face the loss of power projection, at least in the future.

Of course, such descriptions of both countries' militaries are positive things as it means Anglo-American military might is well-positioned to achieve Anglo-American foreign policy goals. But it also means the US and UK militaries do not lack in capability. That is a relative statement, as the conservative realism of the military mind would always prefer more capability. But it is still a true statement in the sense of what the US and UK militaries can achieve. Though they may wish to be bigger and certainly wish to push the state of the art regarding future capability, they do not see themselves as lacking a military capability today.

Because of that essential satisfaction with their forces, those military leaders responsible for building each country's forces have not yet pushed for breaking national stovepipes and cooperating across national borders. Until they are unsatisfied, military leaders will likely put their political capital into expanding what they currently have in scale; in expanding along the political lines already open to them. They will defer to the very real obstacles that exist to technology development sharing: classification problems, competitive advantage, and national political interests. Even though these obstacles are surmountable with a political push, military leaders are likely to withhold their

own political support to expend on other issues because the military does not yet face an inability to conduct its everyday tasks. And without the military weighing in on such cooperation's security value, the political push will likely not gain enough steam to overcome these obstacles. The hard and paradoxical conclusion here is that as long as both nations maintain sovereign militaries capable of projecting power worldwide, the push to overcome national boundaries in technology cooperation is likely to face an uphill battle.

Technology cooperation does not have to be a zero-sum competitive game where one military's gain is another's loss. Because of that, military leaders do not have to oppose these efforts even if they are unlikely to lead them either. It then falls on those others who can see the long-term value of technology development cooperation to build the support to break down existing barriers. It will fall to those in business or research, both in and out of government, who can see the other advantages to push through the obstacles to do so and then cheer when new military capability does arrive.

Alternatively, maybe — as my colleagues argue in these pages — technology or industry will change so much that cooperation will be required. This year's defense science and technology development agreement shows steps have been taken to improve cooperation.

But neither the United States nor the United Kingdom — despite the persistent rhythm of budget gloom — are likely to reach an operational incapability that will force them to dramatically improve their cooperation policies anytime soon. Obviously, that is a good thing: it is better to be so strong than to be weak and dependent on better solutions — but best still to be strong and yet implement the better solutions.

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The need for new strategies, organisational practices and methods of collaboration to protect vital interests in the 21st century

Ben FitzGerald

Declining defense budgets across Europe and the United States are commonly identified as a key driver for defense sector woes. Though true, in many ways fiscal constraints serve merely to highlight deeper issues that have been masked by the funding and operational focus of major ground operations in Afghanistan and Iraq over the past 13 years.

The defense industry faces many challenges today: rising costs, declining programs and research and development, fiscal uncertainty, unclear demand signals from government, policies that hinder global competition and pressures from powerful commercial technology businesses. Many of these challenges stem from the inability of defense organizations, both in government and industry, to adapt to the rapidly changing technological and geopolitical circumstances of the 21st century.

How did this state of affairs come to pass? In many ways, these organizations are victims of past successes. On the technology front, the second half of the 20th century saw significant returns on investment for information-enabled military forces. Under the U.S. Offset Strategy, investment in information-based 'force multipliers' powered U.S. military-technical superiority during the Cold War, successfully 'offsetting' the numerical superiority of Soviet forces. The hallmarks of this strategy, intelligence, surveillance and reconnaissance technologies and capabilities, computer networking, precision strike, global positioning systems and other satellite capabilities now underpin all modern military forces.

Indeed, U.S. investment in information technology was so successful it led to the creation of technologies with broader societal utility from personal computing to the Internet and social media. This democratization of technology has been hugely beneficial for society as a whole but the industries that now control that technology operate largely outside of government control, at a faster

pace and with revenues that dwarf defense budgets. As a measure of the relative size of these markets, Apple Inc. could purchase both Lockheed Martin and Boeing with current cash holdings.¹

In conjunction with a transforming technology environment, the global strategic environment continues to evolve. Changing global demographics including rapid urbanization and regional youth bulges have diffused concentration of power from governments to include individuals. Enabled by social media and other information technologies, major global events continue to unfold at an unprecedented rate and in unpredictable ways as evidenced by the ongoing changes across the Middle East in the wake of the Arab Spring.²

In fact, the ongoing turmoil across the Middle East is helping create non-state actors with capabilities that were previously unavailable to nation states. This is occurring in combination with the economic and military rise of Asian powers, creating new major power dynamics at the same time that the potential for major conflict is re-emerging in Europe. Such trends are challenging for short-term crisis response but also foster a highly uncertain future operating environment, complicating long-term planning and investments in the West. Such uncertainty is compounded, particularly in the U.S., by sustained, systemic uncertainty about current and future defense budgets.

These issues are perhaps most visible in the current challenges in the development of and market for traditional military platforms: increasing costs, declining volumes, decreasing variety of platforms, legal barriers to emerging markets and a lack of competition—a dangerous dynamic most notably seen in fighter aircraft.³ Simultaneously, for newer

1 <http://www.telegraph.co.uk/finance/businesslatestnews/10760392/Apple-and-Microsoft-have-bigger-cash-holdings-than-UK.html>

2 <http://www.tradoc.army.mil/FrontPageContent/Docs/Strategic%20Landpower%20White%20Paper.pdf>

3 <http://www.businessinsider.com/f-35-may-end-production-of-other-jets-2014-8>

capabilities like cyber tools and robotics, the defense industry struggles to maintain competitive access to the skills and technologies required for success. Google's recent acquisition of Boston Dynamics deprived the Defense Advanced Programs and Research Agency of its primary robotics research partner.⁴ Worse, commercial companies with the right skills and technologies are increasingly uninterested in doing business with defense organizations—further stymying state-centric attempts to remain competitive.

Such significant pressure calls into question the fundamental nature of defense strategy and structures. Many of the trends exerting influence on defense organizations also present opportunity for government and defense industry innovation. However, these organizations will continue to be negatively impacted if they do not keep up with the times. Logical reform efforts have been initiated on both sides of the Atlantic: increased international partnering with joint ventures like MBDA, attempts to leverage commercial technology as well as acquisition and regulatory reforms such as Transforming Defence and Better Buying Power programs. While positive, such steps often address symptoms rather than underlying issues.

But defense organizations do not have to remain beholden to their successful pasts. Governments and defense industry on both sides of the Atlantic should seize challenges of this scale as a once-in-a-generation opportunity for change. New visions of the future, and strategies to achieve them, must be developed by government to establish the proper incentives for innovation by militaries, procurement agencies and industry alike.

A successful technology strategy must be capable of flexibly addressing a multipolar and highly dynamic geopolitical environment with contingencies ranging from nuclear deterrence to terrorist attacks. Such a strategy would require a broader variety of capabilities, potentially in larger quantities and at lower costs than are currently developed by 20th century military powers. This breadth of capability might be feasible if defense organizations limit traditional defense development to truly military specific platforms like aircraft carriers or attack

submarines. For other capabilities, international collaboration must be undertaken on a larger scale than is currently the case, with greater reciprocity and more effective business models.

Above all, defense departments, ministries and industry have the opportunity to develop powerful new military capabilities more quickly and at lower cost by leveraging the methods, resources and R&D investments of commercial industries. These opportunities must be capitalized on, exploring ways to leverage advances in manufacturing, materials, software architectures and engineering, design principles, development methods and a host of other areas to develop capabilities for future success.

Current approaches to requirements generation, contracting, funding, export controls and oversight make such a strategy all but impossible to implement. However, these structures are intended to support defense strategy, not guide it, and must be adapted as such. The scale of current pressures on the defense establishment with a clear future trend, combined with the absence of the catastrophic threats of the Cold War era, present both a need and a window of opportunity for change.

U.S. and European militaries and defense industry still produce the most capable systems in the world that act as credible conventional deterrents to truly strategic threats. However, in the absence of meaningful change, U.S. and European militaries and defense industries run the risk of being unable to generate sufficient quantities of high-end capability to deter near peer adversaries or adapt quickly enough to address non-state actors employing asymmetric strategies.

Rather than continuing to cling to the methods of past success until danger is imminent, defense organizations must develop new strategies, structures and methods of collaboration while there is still sufficient momentum, funding and strategic flexibility to do so.

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⁴ <http://www.theverge.com/2014/3/21/5534090/google-rejects-darpa-funding-for-one-of-its-new-robotics-companies>

Innovation before scale: A better business model for transnational armaments cooperation

Steven Grundman and James Hasik

The business model of transnational cooperation in armaments development and production is not working. Though founded on the promise of achieving economies of scale, especially through long production runs, the political allocation of work share in the prevailing model tends to undermine this proposition. In its place, we propose an alternative model organized around the promise of achieving innovation in development among a small core of customers who share a compelling military-technical challenge. Because the resulting business model of transnational cooperation is a more coherent expression of how firms can ally across borders to make money and sustain profitability, it is also more likely to realize material solutions and options that show a worthy return on defense ministries' investments in these ventures.

A Long-Standing but Unworkable Business Model

A business model is "a statement of how a firm will make money and sustain its profit streams over time."¹ What distinguishes one company's approach from alternatives is its particular "blueprint . . . [of the] interdependent systems that create and sustain" its activities.² Most simply for our purposes here, we would characterize such a blueprint in four dimensions: its offerings (what the firm is selling), factors of production (how the firm is rendering the product or service), customers (to whom the firm is selling), and value propositions (why customers buy). In other words, a business model answers the question, "By what proposition do the factors render offerings that create value for customers?). In good business models, the four dimensions cohere, in the sense that they are mutually reinforcing. In bad business models, one or more of the dimensions are in tension, and the enterprise is not likely to succeed. Unpacking the business model of transnational

armaments cooperation reveals why these programs have a poor record and suggests how the four dimensions could be made more coherent.

As Marc De Vore has shown, in armaments, a common model has dominated the largest transnational projects since the late 1960s.³ The offering has often been the most complex weapons systems, with highly integrated technical architectures. To cover the expense of these programs, the customer has tended to be an accumulation of as many defense ministries as are willing to contribute to the budget. To keep everyone happy while addressing the technical challenges, the factors of production—particularly manufacturing operations—have been divided in advance into rigorously defined national work shares. This breadth of participation, it has been thought, is central to a value proposition that targets lower costs through the mechanism of economies of scale in development and manufacturing.

The problem is that the model is not working because the four dimensions of this model are in tension with one another. Back in 1999, a review by McKinsey & Company found that transnational projects had 30 percent higher cost overruns and 30 percent greater schedule slippages than comparable national projects.⁴ Since then, performance has not improved, and essentially every academic study of the issue has detected substantial inefficiencies.⁵

The salient problem confounding the coherence of this business model is work share: Encouraging an increasing number of customers was meant to discourage defections from production programs after development was complete by guaranteeing each national industry a *juste retour*. But parceling out work too many ways hampers management of the supply chain, through both inefficient selection of subcontractors and duplication of industrial

1 David W. Stewart and Qin Zhao, "Internet Marketing, Business Models, and Public Policy," *Journal of Public Policy & Marketing*, Fall 2000, vol. 19, no. 2, p. 290.

2 Michael C. Mayo and Gordon S. Brown, "Building a Competitive Business Model," *Ivey Business Journal*, vol. 63, no. 3, March/April 1999, p. 20; Alexander Osterwalder, Yves Pigneur, and Christopher L. Tucci, "Clarifying Business Models: Origins, Present, and Future of the Concept," *Communications of the Association for Information Systems*, vol. 16, 2005, p. 2.

3 Marc R. De Vore, "The Arms Collaboration Dilemma: Between Principal-Agent Dynamics and Collective Action Problems," *Security Studies*, vol. 20, no. 4, 2011, pp. 652–657.

4 John Dowdy, "A Strategy for European Defense Consolidation," *McKinsey Quarterly*, 1999, no. 4, p. 149.

5 De Vore, *op. cit.*, p. 629

processes.⁶ As Airbus Group CEO Tom Enders candidly observed about the problems that beset the A400M transport aircraft project,

It's no secret that the industry would have preferred the one supplier that was known to be knowledgeable about large turboprop engines, Pratt & Whitney Canada. We conceded to a European consortium that had never worked together on that stuff. We tried to develop an engine by committee, I should say, up to a certain crisis point when this was changed. That has cost taxpayers billions. That has cost industry billions.⁷

Indeed, we feel compelled to point out that scale efficiencies rarely achieve their promise even in big, national projects for which manufacturing operations can be concentrated. For example, the actual cost curves of modern fighter aircraft, invariably produced by unitary enterprises, do not trend endlessly down by a power law. Rather, they tend to bottom out before completion of the first 200 units. The F-22 program, for example, experienced its lowest inflation-adjusted unit costs around the 115th aircraft—some three years and 64 units before production ended.⁸ These increases were not the closure costs of a line shutting down; these represented some form of organizational forgetting as experienced staff moved on to other pursuits, and newbies were trained at a price.⁹

Few national air forces are today interested in more than 200 new fighter jets of a single variant. This means that the learning efficiencies are ending just at the point where any single defense ministry should become interested in spreading production of a single aircraft across borders. Yet that very sharing, when subject to political allocation, dramatically reduces the efficiency of the supply chain, and thus increases overall cost.

A Better Model, Focused on Innovation

In response to this checkered record of transnational cooperation, we offer what we believe to be a better model, in four parts:

⁶ De Vore, op. cit., pp. 656–657.

⁷ Tom Enders, "The State of European Defense," speech in the Atlantic Council Captains of Industry series, Washington DC, 30 April 2014.

⁸ Analysis of the Pentagon budgets in James Hasik, "Exquisite Capabilities, Part II: Why the F-35 is looking a lot like the F-22 these days," 12 August 2011, <http://www.slideshare.net/jhasik/dirm-2011-04-exquisite-part-ii>

⁹ See C. Lanier Benkard, "Learning and Forgetting: the Dynamics of Aircraft Production," *American Economic Review*, vol. 90, no. 4, September 2000, pp. 1034–1054.

First, reset the proposition dimension of the business model from low cost to innovation; or, from the customers' points of view, to expanding the set of options for solving their hardest military-technical problems. Coordinate the multinational funding of multiple, cross-border development teams pursuing new weapons concepts, not production lines.

Accordingly, reset the offering dimension of the model from production to research and development; or, again, from the customers' points of view, to leveraging the best talent from around the world to addressing defense ministries' shared challenges.¹⁰

Third, in organizing the factors of production, concentrate on the hard organizational and regulatory work of combining synergistic engineering and design teams across borders, not on the political work of allocating production lots. We acknowledge that this specification of the factors dimension of a transnational armaments cooperation model implies the need for a more well developed scheme to manage intellectual property, allocate rights, license manufacturing to approved production partners, and transfer the needed manufacturing know-how.

Finally, relieved of the scale motive, this new model can reset the objective of the customer dimension from "more is better" to "few is best". Indeed, there is some evidence that bilateral pairs are ideal.

For example, we find promising and broadly consistent with this new business model the new Anglo-French entente très cordiale.¹¹ At the summit at RAF Brize Norton this past January, Prime Minister Cameron and President Hollande agreed, amongst other things, on a two-year, £120 million joint feasibility study for a "future combat air system," a £10 million contract for developing robotic submersibles for neutralizing seabed mines, and a joint investment in the British Atomic Weapons Establishment for research and testing.¹² We equally commend for illustration the American-Israeli cooperation over missile defense that has

¹⁰ See, for example, Zachary Fryer-Biggs, "International Partners Key To DoD's New R&D Strategy," *Defense News*, 7 July 2014.

¹¹ James Hasik, "The Bilateral Logic of the Anglo-French Summit," *Defense Industrialist*, 3 February 2014, <http://www.atlanticcouncil.org/blogs/defense-industrialist/the-bilateral-logic-of-the-anglo-french-summit>

¹² "UK and France agree closer defence co-operation," press release, prime minister's office, 31 January 2014, <https://www.gov.uk/government/news/uk-and-france-agree-closer-defence-co-operation>

underwritten development of the Israeli Iron Dome¹³ As Lazar Berman of the American Enterprise Institute has written, “[The] Iron Dome model—financially supporting a new system developed by an allied country after it proves itself” is a new and clever way “to maintain American access to cutting-edge defense innovations.”¹⁴

To Start Playing, Pick Your Team

What can industry do to bring this model into practice? Pick a hard military-technical problem shared by more than one ministry, and form an international alliance of complementary capabilities. In the business of defense, Hasik has shown how and when alliances make sense, and the circumstances characterizing those occasions closely resemble the typical transnational opportunity: new technologies and industrial processes buffeting customers’ buying objectives, combined with murky control over intellectual properties and asymmetric power among industrial partners.¹⁵ Implementing this new business model in these circumstance compels the top management of each team to select its partners primarily by capabilities, not just nationality.

The fluidity of an alliance structure, without a 20th century obsession with scale, will produce a more flexible and less costly 21st century approach to achieving value, both for ministries and industries, through the pursuit of transnational armaments cooperation.

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¹³ John Reed, “Israel: Shields Raised,” Financial Times, 31 March 2013.

¹⁴ Lazar Berman, “Israel’s Iron Dome: Why America Is Investing Hundreds of Millions of Dollars,” National Security Outlook no. 2, American Enterprise Institute, September 2012, p. 1

¹⁵ James Hasik, *Arms and Innovation: Entrepreneurship and Alliances in the Twenty-First Century Defense Industry* (Chicago: University of Chicago Press, 2008), pp. 11–12.

Defense industrial and acquisition policy reform:

What is at stake?

Bill Greenwalt

An assessment of trends in the U.S. defense industry and international industrial base collaboration rests on the future direction of DOD industrial base policy and acquisition reform. Ultimately, political leadership needs to address the ideal industrial structure to meet national security needs and the acquisition rules required to incentivize the creation of that structure. A globally integrated commercial-defense industrial base should provide the U.S. with maximum innovation at minimum cost. Politically, this has been and will continue to be a difficult and challenging objective to achieve.

Historically, the U.S. emulated other nations' industrial policy and for security of supply reasons advocated self-sufficiency in meeting its defense needs. This was also seen as good politics by spending defense dollars at home. Protectionist legislation beginning with the Buy American Act of 1933 and the Berry Amendment in 1941 solidified this goal. Compounding this desire for autarky with a monopsony buyer, oftentimes divorced from the realities of the marketplace, has led to costly and inefficient defense-unique acquisition and business processes (to include technology transfer and control). These processes have resulted in an insular, defense-unique industrial base -- essentially a privatized defense arsenal system -- whose comparative advantage is found in procedural compliance.

From this basis, U.S. defense industrial policy tends to gravitate to an analysis of how to maintain capabilities or competition in areas within the defense unique industrial base that are in danger of reliance on sole-source suppliers. While a sector and tiered industrial policy analytical approach is necessary in this restricted market space, it does not take into account the long term, strategic level market assessments that need to occur.

Defense industrial policy should be no less than how best to focus the economic capacity of a nation (and its allies) on the ability to conduct war, or in peacetime maintain the capabilities to be able to

quickly conduct required military operations. At such a strategic level, the underlying economic and financial strength of a nation is critical -- i.e., can the underlying economy support the expenditures required to fund an adequate defense, but also what are the capabilities present in the civilian sector that can support defense?

Theoretically, while the economic strength of the U.S. to support defense spending should not be in doubt, the political choice of how to spend one's resources is another matter. Rising debt levels and a desire to spend more on a welfare state has crowded out the ability to afford the current defense arsenal system. As there seems to be little political desire or agreement to address entitlements, there is little relief in sight for defense beyond major increases in underlying economic growth or adding to the national debt. Absent these increases, another model for maintaining defense capabilities has to be found or current and future military readiness will dramatically decline.

While the civilian economy is and will continue to be important to DOD as a source of general funds through taxation, it has also been seen as a source of surge production and raw material inputs. The authorities of the Defense Production Act of 1950 are designed to allocate and ensure domestic sources of supply for defense purposes and are based on the World War II experience of the conversion of the civilian industry for defense. Reciprocal defense agreements with U.S. allies ultimately serve this same purpose. This is obligatory civil-military integration of the industrial base at the central planning level, but there is a much broader and more significant civil military integration at the commercial market level that needs to occur. This integration is key to an ideal industrial policy and strikes at the heart of the nature of innovation and productivity to support national security.

If ideally encouraged, or at a minimum not constrained, there is a technological push-pull mechanism that operates across the threshold of the defense and civilian industrial bases. Military R&D and knowledge can flow to the civilian sector and vice versa. In the civilian sector more so than in defense, market incentives and R&D expenditures morph derivative knowledge into new products or services that reduce cost or enhance productivity far beyond anything the DOD could create on its own. The development of the IT industry from its Pentagon roots in the 1950s and the reincorporation of civilian advances in this technology back into defense in the 1990s is perhaps the greatest example of this type of civil military integration, but there are many others. With the right acquisition policies and incentives this type of innovation can be encouraged to develop and continuously adapted into the defense enterprise.

Despite these advances, there is a history of resistance at DOD to the incorporation of civilian technology and business methods. The Pentagon's business processes seem impervious to reform unless there is a crisis and as long as the US maintains technological dominance and expansive budgets there is little reason to change. Thus, two factors (declining budgets and technological surprise) combined with senior leadership advocacy will be the drivers behind any business transformation. This leadership is required to not only overcome risk-averse behavior within the DOD bureaucracy but also build a coalition in Congress to support the right enabling policies.

For example, it was the Packard Commission's assessment in the mid-1980s that DOD was at risk of falling behind if it did not embrace commercial R&D trends, particularly in IT. Technological surprise came not from the Soviet Union or a new near-peer but the commercial marketplace. Still, reform did not happen until budgets were drastically reduced at the end of the Cold War and even then readiness and modernization were first allowed to suffer. Finally, needed leadership was amply provided by Secretary of Defense Bill Perry (who had experience in both the commercial and defense industries) and then was actively supported by the Congress. This resulted in legislation in 1994 that removed some requirements for defense unique business and oversight practices that were no longer affordable

and served as barriers to incorporating commercial innovation.

The next round of reform (only partially implemented) came from the realizations that the commercial supply chain was undergoing massive globalization and that to maintain competition in the defense unique industrial base foreign participation was needed. By the late 1990s, the movement to break down the barriers to commercial and globalized solutions reaching the defense market was in full swing. However, with the increase in the defense budget in the aftermath of 9/11 the impetus for reform was largely forgotten. Rapid acquisition authorities passed in the early 2000s (used to access commercial and global solutions to meet DOD needs during the conflicts in Iraq and Afghanistan) can be seen as the last vestiges of the acquisition reform movement.

The foundation for the development of a global civil-military industrial base structure has not been eliminated, but it has been rolled back in the last five years as DOD has begun to revert back to the autarkic, centrally-planned model. In one sense this model never went away but had an emerging commercial/international acquisition alternative overlaid on top of it. Without leadership to sustain it, the antibodies in the Pentagon began to reject this alternative. Commercial solutions are now increasingly suspect due to pricing and security reasons. Old arguments about security of supply are beginning to be raised and while there is less open public protectionist debate than there was when the House of Representatives proposed new Buy American legislation almost 10 years ago, there appears to be an increase in more subtle de facto protectionism.

Unfortunately, what has been advertised as acquisition reform in the current Administration (to include the Better Buying Power (BBP) initiative) has been a near-term focus on cost transparency, low price, and eliminating "excess" profits at the expense of quality, innovation and long term cost reduction and performance. It remains to be seen if the third round of BBP to be announced this week will focus on the necessary incentives to enable innovation and take a different approach to acquisition reform.

Despite these trends, the underlying environment could provide an opportunity for positive change. As in the Post Cold War period, resource constraints are a motivating factor to begin a discussion on the fundamental policy choices that will need to be made to reconcile budgetary reality with long-term defense needs. The factors in those choices now are similar to before, but accentuated.

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Technological surprise is perhaps the most compelling factor for change. Senior leadership from the Secretary of Defense down has recently expressed concerns about the U.S. losing its technological edge. DOD officials have stated that the U.S. has lost the electromagnetic spectrum and lamented the impact of cheap commercial jammers and technologies. Other countries (including China and Israel) and non-state entities are learning the value of civil-military integration of the industrial base just when the U.S. is erecting new barriers to achieving this integration.

What will it take for the leadership in the Pentagon and Congress to aim for the high ground of the national defense and security interest and reinstate the reforms of the 1990s that allowed for civil military integration and greater international collaboration? Will senior Pentagon leadership address the compelling need for the right acquisition and business policies to take advantage of global trends in technology and manufacturing?

One should hope it does not take something like the loss of U.S. advantages in stealth and undersea warfare or defeat in electronic warfare or cyberspace to get policymakers to think radically different about how defense business is done. It would be better if technological surprise came from within or from our allies through their own civil-military integration efforts rather than a potential adversary. Ultimately, a new potential threat combined with budgetary constraints and a vocal leadership may be the only path forward that will be able to overcome the entrenched bureaucracy, business as usual mentality and collusion of local interests embedded in defense spending that serves to prop up current industrial and acquisition policy in the United States. A difficult but necessary debate lies ahead in the coming years and there is no guarantee that the right approach will be chosen.

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